



Docket No. 8733.573.00
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sung Hoe YOON

Customer No. 30827

Application No. 10/026,473

Confirmation No. 7768

Filed: December 27, 2001

Art Unit: 2871

For: REFLECTIVE CHOLESTERIC LIQUID
CRYSTAL DISPLAY DEVICE AND
MANUFACTURING METHOD FOR THE
SAME

Examiner: Dung T. Nguyen

MS Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

In response to a Final Rejection of all pending claims that was mailed on August 23, 2005 and an Advisory Action that was mailed on December 6, 2005, and in support of a “Pre-Appeal Brief Request for Review” filed December 22, 2005, Appellants hereby submit this Appeal Brief.

The fees required under § 1.17(f) and any required petition for extension of time for filing this brief and fees therefore are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37(c):

- I. Real Party In Interest**
- II. Related Appeals and Interferences**
- III. Status of Claims**

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IV. Status of Amendments

V. Summary of Claimed Subject Matter

VI. Grounds of Rejection to be Reviewed on Appeal

VII. Argument

Appendix A Claims

Appendix B Evidence

Appendix C Related Proceedings

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is: LG.PHILIPS LCD CO., LTD.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Total Number of Claims in the Application

There are 12 claims pending in the application.

Current Status of Claims

Claims canceled: 2 and 9.

Claims withdrawn from consideration but not canceled: None.

Claims pending: 1, 3-8, and 10-14.

Claims allowed: None.

Claims rejected: 1, 3-8, and 10-14.

Claims On Appeal: The claims on appeal are claims 1, 3-8, and 10-14.

IV. STATUS OF AMENDMENTS

The Examiner issued a Final Rejection on August 23, 2005 and an Advisory Action on December 6, 2005. No amendment has been filed in response to this Final Rejection or Advisory action. Accordingly, the claims enclosed herein as Appendix A reflect the current status of claims 1, 3-8 and 10-14.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to a reflective cholesteric liquid crystal (CLC) display device and manufacturing method of a lower substrate for the reflective CLC display device that substantially obviates one or more of the problems due to limitations and disadvantages of the related art. The reflective CLC display device includes a first substrate 110 and an absorption layer 120 on the first substrate 110. (See Fig. 3, ¶ 0029.) A cholesteric liquid crystal color filter 140 is formed on the absorption layer 120. (See Fig. 3, ¶ 0029.) The cholesteric liquid crystal color filter 140 has a plurality of protrusions, and the shape, size and distribution of the protrusions are controlled to make a distribution of reflected light be uniform within a viewing angle range of about 30 degrees upward and downward from a front direction. (See Fig. 4, ¶ 0031.) An overcoat layer 150 is placed on the CLC color filter. (See Fig. 3, ¶ 0029.) Next, a first electrode 160 is formed on the overcoat layer 150. (See Fig. 3, ¶ 0029.) The CLC display device also includes a second substrate 210 with a second electrode 220 beneath the second substrate 210. (See Fig. 3, ¶ 0029.) A retardation layer 310 is formed on the second substrate 210, and a polarizer 320 is formed on the retardation layer 310. A liquid crystal layer 400 is placed between the first electrode 160 and the second electrode 220. (See Fig. 3, ¶ 0029.)

The present invention also includes a method of forming a reflective liquid crystal display device having a cholesteric liquid crystal color filter. First, an absorption layer 120 is formed on a first substrate 110. (See Fig. 5A, ¶ 0033.) A first alignment layer 130 is formed on the absorption layer 120. (See Fig. 5A, ¶ 0033.) A cholesteric liquid crystal is coated on the alignment layer 130. (See Fig. 5B, ¶ 0034.) A photoresist layer 500 is formed on the cholesteric liquid crystal layer. (See Fig. 5B, ¶ 0034.) A mask 600 having a plurality of transmissive portions and a plurality of blocking portions 620 is placed over the photoresist 500. (See Fig. 5B, ¶ 0034.) Then, the photoresist 500 is exposed to light. (See Fig. 5B ¶ 0034.) Selected portions of the photoresist are removed. (See Fig. 5C, ¶ 0035.) The cholesteric liquid crystal layer is patterned using the photoresist 500 as a mask to form a plurality of protrusions on the cholesteric liquid crystal layer. (See Fig. 5D, ¶ 0036.) An overcoat layer 150 is provided over the protrusions and the cholesteric liquid crystal layer to form a substantially even surface. (See Fig. 5E, ¶ 0037.) A second substrate 210 opposite the first substrate 110. (See Fig. 3, ¶ 0029.) A liquid crystal 400 is interposed between the first and second substrates 110, 210. (See Fig. 3, ¶ 0029.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Examiner rejected claims 1, 3-8, and 10-14 under 35 U.S.C. 103(a) as being unpatentable over the Applicants Related Art ("ARA") in view of U.S. Patent No. 5,682,212 to Maurer ("Maurer").

VII. ARGUMENT

- A. The Examiner improperly rejected claims 1 and 3-8 under 35 U.S.C. § 103(a) as being allegedly unpatentable over the ARA in view of Maurer.

The rejection of claims 1 and 3-8 is respectfully traversed and reconsideration is requested. Claims 1 and 3-5 are allowable over the cited references in that these claims recite a combination of elements including, for example, “a cholesteric liquid crystal color filter on the absorption layer, the cholesteric liquid crystal color filter having a plurality of protrusions, a shape, a size and a distribution of the protrusions being controlled to make a distribution of reflected light be uniform within a viewing angle range of about 30 degrees upward and downward from a front direction.” Claims 6-8 are allowable over the cited references in that these claims recite a combination of elements including, for example, “forming a cholesteric liquid crystal color filter over the absorption layer, the cholesteric liquid crystal color filter having a plurality of protrusions, a shape, a size and a distribution of the protrusions being controlled to make a distribution of reflected light be uniform within a viewing angle range of about 30 degrees upward and downward from a front direction.” The ARA nor Maurer teaches, either singly or in combination, at least these features of the claimed invention. Accordingly, claims 1 and 3-8 are allowable over the various cited references.

In the Final Rejection, the Examiner relies solely on Maurer as teaching this feature of the claimed invention. In the Final Rejection the Examiner stated the cholesteric color filter of Maurer functions “as a combination color filter, polarizer and lens (Column 2, Lines 30-40) and for uniform luminance.” Because Maurer does not state that its purpose is to produce uniform luminance, the Applicants’ last response filed on June 9, 2005 requested that the Examiner support this assertion. In response the Examiner basically states because the structure of Maurer is the same as the present invention it must have this feature. Such an argument is circular. In the Advisory Action, the Examiner again ignores this request for clarification of this assertion. In reality, Maurer is directed to various optical elements that may be fabricated using cholesteric liquid crystal elements. Specifically, optical element for use in image projectors. As identified by the Examiner these cholesteric color filter elements may be used as a combination color filter, polarizer and lens, thus providing various benefits in the optical elements of an image projector. Further, Figs. 2 and 2a cited by the Examiner as teaching this feature are described as: “A CLC layer (3) of constant thickness is located between the transparent substrate surface containing a

field of 5x8 convex lenses (17) and the transparent substrate surface containing 5x8 concave lenses (18).” This structure is directed to lenses, which is consistent with the fact that Maurer is directed to optical elements for use in an image display system. The various examples of devices in Maurer are directed to lenses, mirrors, etc. So Maurer does not teach this feature of the claimed invention.

Further, Maurer is non-analogous art. It is directed to optical elements for use in an image projector. There is no mention in Maurer of a liquid crystal display devices. One of skill in the art looking to modify the ARA would not look to Maurer to overcome the limitation of the ARA. It is directed generally to optical elements that incorporate cholesteric liquid crystals. In the Advisory action, the Examiner only addresses one of the arguments put forth by Applicants: that is that Maurer is non-analogous art. In response to this the Examiner cites the following portions of Maurer: column 4, lines 60-67; column 5, lines 1-5; Figure 5 elements 13a-13c; and column 6, lines 1-20.

Column 4, line 60 to column 5, line 5 discusses how planar alignment of the cholesteric materials can use techniques that have been developed and used for creating alignment layers in liquid crystal displays. So this passage does not disclose using the lens disclosed in Maurer in a liquid crystal display as implied by the Examiner’s combination of Maurer and the ARA. Figure 5 shows a projector for displaying an image. This projector uses the CLC elements in a lens and beam splitting element. The three LCD elements 13a-13c are used to each modulate the separated red, green, or blue light. So while the projector of Fig. 5 uses LCD elements, they are only one part of the overall projector. The CLC elements are completely separate from the LCD elements. Also, the structure of the flat panel LCD display of the present invention is completely different from a display implemented using the projector of Maurer. Therefore, this combined with the previously stated arguments show that one of skill in the art would not look to combine the teaching of Maurer with the teaching of the ARA. Accordingly, claims 1 and 3-5 are allowable over the ARA and Maurer.

- B. The Examiner improperly rejected claims 10-14 under 35 U.S.C. § 103(a) as being allegedly unpatentable over the ARA in view of Maurer.

The rejection of claims 10-14 is respectfully traversed and reconsideration is requested. Claims 10-14 are allowable over the cited references in that these claims recite a combination of

elements including, for example, "patterning the cholesteric liquid crystal layer using the photoresist as a mask to form a plurality of protrusions on the cholesteric liquid crystal layer."

The ARA nor Maurer teaches, either singly or in combination, at least these features of the claimed invention. Accordingly, claims 10-14 are allowable over the various cited references.

Claims 10-14 are allowable over Maurer for the reasons discussed above. In addition, neither Maurer or the ARA disclose the various steps for forming the plurality of protrusions on the cholesteric liquid crystal layer. The Office Actions summarily states that it would have been obvious to one of ordinary skill in the art to manufacture the device. No such steps are disclosed. Further, the structure mentioned is not obvious for the reasons stated above. Accordingly, claims 10-14 are allowable over the ARA and Maurer.

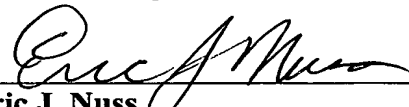
A copy of the claims involved in the present appeal is attached hereto as Appendix A.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. § 1.136, and any additional fees required under 37 C.F.R. § 1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

Dated: April 21, 2006

By


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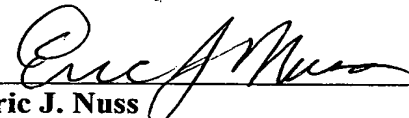
A copy of the claims involved in the present appeal is attached hereto as Appendix A.

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APPENDIX A

Claims Involved In The Appeal Of Application No. 10/026,473:

1. (Previously Amended) A reflective cholesteric liquid crystal (CLC) display device, comprising:
 - a first substrate;
 - an absorption layer on the first substrate;
 - a cholesteric liquid crystal color filter on the absorption layer, the cholesteric liquid crystal color filter having a plurality of protrusions, a shape, a size and a distribution of the protrusions being controlled to make a distribution of reflected light be uniform within a viewing angle range of about 30 degrees upward and downward from a front direction;
 - an overcoat layer on the cholesteric liquid crystal (CLC) color filter;
 - a first electrode on the overcoat layer;
 - a second substrate;
 - a second electrode beneath the second substrate;
 - a retardation layer on the second substrate;
 - a polarizer on the retardation layer; and
 - a liquid crystal layer between the first electrode and the second electrode.
2. (Canceled)
3. (Original) The device according to claim 1, wherein a shape, a size and a distribution of the protrusions are controlled to make a distribution of reflected light be decreased gradually within about 20% of the luminance of a front direction.

4. (Original) The device according to claim 1, wherein the reflective cholesteric liquid crystal display device further includes a thin film transistor, which switches a signal to the second electrode, on the second substrate.

5. (Original) The device according to claim 1, wherein the reflective cholesteric liquid crystal (CLC) display device further includes a thin film transistor, which switches a signal to the first electrode, on the first substrate.

6. (Previously Presented) A manufacturing method of a lower substrate for a reflective cholesteric liquid crystal (CLC) display device, comprising:

forming an absorption layer on an insulating substrate;

forming a cholesteric liquid crystal color filter over the absorption layer, the cholesteric liquid crystal color filter having a plurality of protrusions, a shape, a size and a distribution of the protrusions being controlled to make a distribution of reflected light be uniform within a viewing angle range of about 30 degrees upward and downward from a front direction;

forming an overcoat layer on the cholesteric liquid crystal color filter; and

forming a transparent electrode on the overcoat layer.

7. (Previously Presented) The method according to claim 6, wherein the plurality of protrusions of the cholesteric liquid crystal color filter is formed through exposing and developing a photoresist film.

8. (Original) The device according to claim 1, wherein the protrusions have a rounded surface.

9. (Canceled)

10. (Previously Presented) A method of forming a reflective liquid crystal display device having a cholesteric liquid crystal color filter, comprising:

forming an absorption layer on a first substrate;

forming a first alignment layer on the absorption layer;

coating a cholesteric liquid crystal on the alignment layer;

forming a photoresist layer on the cholesteric liquid crystal layer;

providing a mask having a plurality of transmissive portions and a plurality of blocking portions over the photoresist;

exposing the photoresist to light;

removing selected portions of the photoresist;

patterning the cholesteric liquid crystal layer using the photoresist as a mask to form a plurality of protrusions on the cholesteric liquid crystal layer;

providing an overcoat layer over the protrusions and the cholesteric liquid crystal layer to form a substantially even surface;

providing a second substrate opposite the first substrate; and

interposing a liquid crystal between the first and second substrates.

11. (Original) The method of claim 10, wherein the photoresist is a negative photoresist.

12. (Original) The method of claim 10, wherein the photoresist is a positive photoresist.

13. (Original) The method of claim 10, further comprising forming a first electrode on the overcoat layer.

14. (Original) The method of claim 10, further comprising forming a second alignment layer on the second substrate.

APPENDIX B

Evidence:

None.

APPENDIX C

Related Proceedings:

None.